

CLAIMS

- 5 1. A method of manufacturing electrodes, the method comprising the steps of:
- a) attaching a first electrode to a first reusable header;
 - b) heating the first electrode to a temperature sufficient to melt said first electrode;
 - c) depositing the molten metal from the first electrode into a crucible;
 - 10 d) solidifying the molten metal to form a second electrode, whereby said second electrode has at least a portion complementarily shaped to a second reusable header.
- 15 2. The method of manufacturing as set forth in claim 1, further comprising the steps of:
- e) attaching the second electrode with the second reusable header;
 - f) positioning the second electrode attached to the second reusable header in communication with a second crucible, the second crucible having at least a portion complementarily formed to a third reusable header;
 - 20 header;

- g) heating the second electrode to a temperature sufficient to melt said second electrode;
- h) depositing molten metal from the second electrode into said second crucible;
- 5 i) solidifying the molten metal from the second electrode to form a third electrode.

3. The method of manufacturing as set forth in claim 2, further comprising the steps of:

10 attaching the third electrode to the third reusable header and repeating the steps of positioning the electrode in communication with a crucible, heating the electrode to a temperature sufficient to melt the same; depositing the molten metal into the crucible and solidifying the molten metal to form an additional electrode, until a final electrode of the desired metallurgical quality
15 is produced.

4. The method of manufacturing as set forth in claim 2, wherein the first and second reusable headers are of similar physical configuration.

5. The method of manufacturing as set forth in claim 3, wherein at least two of the first, second and third reusable headers are of similar physical configuration.

5 6. The method of manufacturing as set forth in claim 5, wherein all of the first, second and third reusable headers are of similar physical configuration.

10 7. The method of manufacturing as set forth in claim 1, further comprising a step of:

placing a stub in the crucible prior to the step of heating the first electrode; wherein the stub has an upper surface and a lower surface, the lower surface having a shaped portion complementarily shaped to the second reusable header and wherein the stub is placed in the crucible so that the shaped portion faces downwardly away from the first electrode.

15 8. The method of manufacturing as set forth in claim 7, further comprising the steps of:

dripping the molten metal from the heated first electrode onto the upper surface of the stub;

20 melting at least a portion of the upper surface of the stub; and

integrally bonding the second electrode to the upper surface of the stub.

5 9. The method of manufacturing as set forth in claim 1, wherein the step of attaching the first electrode to the first reusable header is accomplished by interlocking complementarily shaped portions of the first electrode and first reusable header together.

10 10. The method of manufacturing as set forth in claim 9, wherein the step of attaching the first electrode to the first reusable header further includes the step of threading fasteners against the shaped portion of one of the first electrode and the first reusable header so that relative movement between the first electrode and first reusable header is substantially prevented.

15 11. The method of manufacturing as set forth in claim 9, wherein the step of attaching the first electrode to the first reusable header includes the step of:

20 integrally bonding the first electrode to a stub, wherein the stub has a lower surface that includes an area complementarily shaped to the shaped

portion of the first reusable header and subsequently interlocking the complimentary shaped area of the stub and the header portion together.

5 12. The method of manufacturing as set forth in claim 11, wherein the stub is manufactured from the same material as the first electrode.

10 13. The method of manufacturing as set forth in claim 11, further comprising the step of placing scrap metal pieces into a cold hearth furnace and then heating the pieces to a temperature sufficient to at least partially bond them together to form a first electrode.

 14. The method of manufacturing as set forth in claim 13, further comprises the step of welding the bonded scrap metal pieces to the stub.

15 15. The method of manufacturing as set forth in claim 2, wherein the step of attaching the second electrode to the second reusable header is accomplished by interlocking complimentary shaped portions of the second electrode and second reusable header together.

20 16. The method of manufacturing as set forth in claim 15, wherein the step of attaching the second electrode to the second reusable header

includes the step of integrally bonding the second electrode to a second stub, wherein the second stub has a lower surface that includes an area complementarily shaped to the shaped portion of the second reusable header and subsequently interlocking the complementarily shaped area of the second stub and the second reusable header portion together.

17. The method of manufacturing as set forth in claim 16, wherein the step of attaching the second electrode to the second reusable header further includes the step of threading fasteners against the shaped portion of one of the second stub and the second reusable header so that relative movement between the second stub and second reusable header is substantially prevented.

18. A method of manufacturing electrodes, the method comprising the steps of:
- a) attaching a first electrode to a first reusable header, wherein at least a section of the first reusable header is manufactured from substantially the same metal as the first electrode;
 - b) heating the first electrode to a temperature sufficient to melt said first electrode;

- c) depositing the molten metal from the first electrode into a crucible;
- d) solidifying the molten metal to form a second electrode.

5 19. The method of manufacturing as set forth in claim 18, further comprising the steps of:

- e) attaching the second electrode with the second reusable header, wherein at least a section of the second reusable header is manufactured from substantially the same metal as the second electrode;
- 10 f) positioning the second electrode attached to the second reusable header in communication with a second crucible;
- g) heating the second electrode to a temperature sufficient to melt said second electrode;
- h) depositing molten metal from the second electrode into said second
15 crucible;
- i) solidifying the molten metal from the second electrode to form a third electrode.

20 20. The method of manufacturing as set forth in claim 19, further comprising the steps of:

attaching the third electrode to the third reusable header, wherein at least a section of the third reusable header is manufactured from substantially the same metal as the third electrode; and repeating the steps of positioning the electrode in communication with a crucible, heating the electrode to a temperature sufficient to melt the same; depositing the molten metal into the crucible and solidifying the molten metal to form an additional electrode, until a final electrode of the desired metallurgical quality is produced.

21. The method of manufacturing as set forth in claim 18, wherein the step of attaching the first electrode to the first header further comprises the step of:
interlocking complimentary shaped portions on the first electrode and first reusable header together.

22. The method of manufacturing as set forth in claim 18, wherein said section of the first reusable header is a detachable stub and said step of attaching the first electrode to the first reusable header further comprises the step of:
integrally bonding the first electrode to the stub.

23. The method of manufacturing as set forth in claim 22, further comprising the step of placing scrap metal pieces into a cold hearth furnace and then heating the pieces to a temperature sufficient to at least partially bond them together to form a first electrode.
24. The method of manufacturing as set forth in claim 23, further comprises the step of welding the bonded scrap metal pieces to the stub.
25. The method of manufacturing as set forth in claim 22, wherein the step of attaching the first electrode to the first reusable header is accomplished by interlocking complementarily shaped portions of the stub and first reusable header together.
26. The method of manufacturing as set forth in claim 25, wherein the first and second reusable headers are of similar physical configuration.
27. The method of manufacturing as set forth in claim 26, wherein at least two of the first, second and third reusable headers are of similar physical configuration.

28. The method of manufacturing as set forth in claim 27, wherein all of the first, second and third reusable headers are of similar physical configuration.

5 29. The method of manufacturing as set forth in claim 19; wherein said section of the second reusable header is a detachable second stub and said step of attaching the second electrode to the second reusable header further comprises the steps of:

10 placing the second stub in the crucible prior to step of heating the first electrode;

dripping the molten metal from the heated first electrode onto the upper surface of the second stub;

melting at least a portion of the upper surface of the second stub; and

15 integrally bonding the second electrode to the upper surface of the second stub.

20 30. The method of manufacturing as set forth in claim 29, wherein the step of attaching the second electrode to the second reusable header is accomplished by interlocking complementarily shaped portions of the second stub and second reusable header together.

31. The method of manufacturing as set forth in claim 30, wherein the step of attaching the second electrode to the second reusable header further includes the step of threading fasteners against the shaped portion of one of the second stub and the second reusable header so that relative movement between the second stub and second reusable header is substantially prevented.

32. A reusable header for supporting an electrode for melting in a furnace, the reusable header comprising:
a base having a first end and a second end;
a shaft extending from the first end of the base, the shaft being adapted to connect the header to a ram for reciprocal movement within the furnace;
an attachment adapted to releasably secure the electrode to the second end of the base.

33. The reusable header as set forth in claim 32, wherein the attachment comprises a shaped recess and a shaped projection, wherein one of the shaped recess and the shaped projection is formed in the second end of the base and the other of the shaped recess and shaped projection formed on the electrode, and wherein said recess is complementarily shaped to interlock with the projection.

34. The reusable header as set forth in claim 33, wherein the recess and projection are a dovetail shape.

5 35. The reusable header as set forth in claim 34, wherein the recess has first walls and the projection has second walls and the header further includes at least one clamp that forces the second walls of the projection into engagement with the first walls of the recess.

10 36. The reusable header as set forth in claim 35, wherein the clamp is at least one screw.

37. The reusable header as set forth in claim 36, wherein the screw enters the first end of the base, extends through the base and terminates adjacent the shaped end of the electrode at the second end of the
15 base.

38. The reusable header as set forth in claim 32, wherein at least a section of the header is manufactured from a metal that is substantially the
20 same as the electrode which it is adapted to support.

39. The reusable header as set forth in claim 38, wherein said section is a detachable stub, said stub having an upper surface and a lower surface; the stub being releasably connectable to the header.

5 40. The reusable header as set forth in claim 39, wherein the lower surface of the stub has an area complementarily shaped to the shaped portion of the header and the shaped area of the stub interlocks with the shaped portion of the header.

10 41. The reusable header as set forth in claim 40, wherein the electrode is integrally bonded with the upper surface of the stub;

42. The reusable header as set forth in claim 41, wherein the recess and projection are a dovetail shape.

15 43. The reusable header as set forth in claim 42, wherein the recess has first walls and the projection has second walls and the header further includes at least one clamp that forces the second walls of the projection into engagement with the first walls of the recess.

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44. The reusable header as set forth in claim 43, wherein the clamp is at least one screw.